

TORREYA

August, 1917.

Vol. 17

No. 8

THE NATIVE PLANT POPULATION OF NORTHERN QUEENS COUNTY, LONG ISLAND

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In the January number of TORREYA the writer sketched the conditions of vegetation in the unglaciated portion of Kings and Queens Counties, in the western part of Long Island. The present paper deals in a similar manner with an area adjoining that on the north, namely, the glaciated portion of Queens County; and the explanation given in the former paper of the methods of gathering and digesting the facts will not need to be repeated here.

In the glaciated portion of Kings County (Brooklyn) there are now about 40,000 inhabitants per square mile, and consequently no natural vegetation worth mentioning other than small areas of tidal marsh; but in the corresponding portion of Queens, which although a part of New York City since 1898 has not over 5,000 inhabitants per square mile on the average, nearly 10 per cent. of the area, or five or six square miles, is still covered with essentially natural vegetation, which is well worth studying. Almost every remaining patch of forest as much as fifty acres in extent was examined by the writer during the past season, and some in earlier years, beginning about 1907. The statistics of the native plant population given farther on are therefore believed to be reasonably accurate as far as they go.

Geology and soil.—In Long Island City there are a few outcrops of gneiss (which probably once supported some rock-loving plants not found elsewhere on the island). Farther east the formation immediately under the glacial drift is Cretaceous, but it does not appear at the surface within our limits and has no perceptible influence on soil or topography. The surface material is glacial drift many feet thick, composed of clay, sand,

[No. 7, Vol. 17 of TORREYA, comprising pp. 111-129, was issued 18 July, 1917]

and boulders of all sizes, the last all of trap, granite, and other non-calcareous metamorphic rocks, such as are found in place on the mainland not far away. Those less than a foot in diameter are pretty well rounded by the action of ice or water during the Glacial Period.

The commonest type of soil is a brown loam plentifully supplied with pebbles and cobbles. It is called "Miami stony loam" in the soil survey of western Long Island published by the U. S. Bureau of Soils in 1905, in which the following physical analysis is given of a sample taken two miles east of Flushing. This represents only the "fine earth," the pebbles exceeding two millimeters in diameter having been sifted out. The figures in the first column indicate the diameters of the soil particles, and the others percentages.

	Soil 0-14 In.	Subsoil 14-36 In.
Gravel, 2-1 mm.....	1.72	1.78
Coarse sand, 1-.5 mm.....	4.96	5.50
Medium sand, .5-.25 mm.....	3.86	4.14
Fine sand, .25-.1 mm.....	8.28	8.58
Very fine sand, .1-.05 mm.....	20.48	22.90
Silt, .05-.005 mm.....	43.36	44.40
Clay, .005-.0001 mm.....	17.40	12.70
Organic matter.....	3.06	1.16
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Total.....	103.12	101.16

The soil and subsoil do not differ much, which probably indicates that the soil has undergone very little weathering since it was deposited by the glaciers. No chemical analyses are available, unfortunately, but the principal minerals in the soil are said to be feldspar, muscovite and biotite mica, hornblende, and quartz. These and the large percentage of silt, clay, and organic matter indicate a soil well above the average in fertility. It is rather impervious to water, as shown by the occurrence of swampy pools near the tops of some of the hills.

Few of the pebbles and smaller boulders appear on the surface in undisturbed areas, probably on account of the activities of earthworms, which abound in this type of soil. The rocks too large to be buried by the worms are not large enough to support any vegetation other than a few mosses and lichens, and the

latter are always scarce in thickly settled regions, as they are said to flourish only in the purest air.

A less common type of soil in Queens County (but the prevailing type a little farther east) has less silt and clay and more sand and gravel, the latter covering the surface pretty thickly in some places. This has been mapped as "Alton stony loam." There are extensive salt marshes of the ordinary type at the heads of Flushing and Little Neck bays and in a few other places, and smaller areas of peat and muck in undrained depressions. There are no dunes, and sand as a soil type is almost confined to narrow beaches too small to show on the soil map.

Topography and hydrography.—The area is moderately hilly throughout, ranging in altitude from sea-level to about 250 feet. There are many undrained depressions characteristic of glaciated topography, usually not more than 30 feet deep and a few acres in extent. Some of these are dry most of the time, and some partly filled with water or peat. As in many other fertile regions,* springs and swift streams are scarce. Rivers are likewise absent, on account of the narrowness of the island here. The creeks are all tidal estuaries, bordered by marshes, and the brooks, none of which are more than 100 feet above sea-level, are bordered by swamps or meadows. Some of the fresh and brackish marshes are utilized for public water supply by means of numerous wells driven down in them and connected with pumping stations near by.

Climate, etc.—The climate is similar to that of the south side of the island, but doubtless a little colder in winter. The average growing season is probably about 190 days, or about the same as at the northern edge of Georgia and Alabama. A minor environmental factor, which affects the explorer but not the vegetation, is the presence of mosquitoes in the woods practically throughout the growing season, or about half the year.

Vegetation.—As already stated, about one tenth of the area under considreation still bears what appears to be natural vegetation. The commonest type was, and is, deciduous forests

* *E. g.*, the Tallahassee red hills and Ocala hammocks of Florida, the black belt of Alabama, the Yazoo delta of Mississippi, the prairies of Illinois, and the great central valley of California.

on the loamy uplands. These are well supplied with humus, and may be designated for brevity rich woods. On the more gravelly soil ("Alton stony loam") the forests are much the same in aspect, but include a few trees rarely seen on the richer soils, such as *Tsuga*, *Quercus coccinea* and *Q. montana*, and the shrubs and herbs differ correspondingly. Wet woods or swamps are quite common, but not extensive. There are a few wet meadows, similar to those so characteristic of New England, which may or may not be natural phenomena.* The salt marshes were almost undisturbed until about a square mile along Flushing Creek was filled in a few years ago, but they seem to present no striking features. Toward the heads of some of the streams emptying into Flushing Bay the salt marshes pass gradually into fresh marshes, with a greater variety of plants, much like the wet meadows above the influence of tide. There are also a few large cat-tail marshes several feet above sea-level and not connected with tidal marshes, and a few small ponds and undrained bogs. The abundant weed vegetation is not considered here, though it presents some interesting problems which may be worth investigating in the near future.

Plant census.—In the following list all the various habitats are combined, but the normal habitat of each species is stated briefly. The species in each structural class are arranged as nearly as possible in order of abundance, as usual, and for the trees the percentages are given to the nearest integer. Species believed to constitute less than half of one per cent. of their class are omitted, as are all bryophytes and thallophytes, for the reasons given in the paper on southern Kings and Queens Counties in the January number.

TREES

14 <i>Quercus velutina</i>	Uplands
11 <i>Castanea dentata</i> †	Uplands

* See *Torrey* 16: 269-270 (footnote). 1917.

† Since 1906 the chestnut has been dying from canker (*Endothia parasitica*), and there are now comparatively few living trees and no sound ones; but it has been counted here as it was in 1905. If it fails to survive the epidemic the percentages of the other trees will be increased proportionately.

11 <i>Betula lenta</i>	Rich woods
9 <i>Acer rubrum</i>	Uplands and swamps
9 <i>Quercus alba</i>	Uplands
7 <i>Fagus grandifolia</i>	Gravelly soils mostly
7 <i>Hicoria spp.*</i>	Uplands
6 <i>Liriodendron Tulipifera</i>	Rich woods
5 <i>Liquidambar Styraciflua</i>	Rich woods
4 <i>Quercus borealis maxima</i> †	Uplands
3 <i>Quercus palustris</i>	Swamps mostly
2 <i>Ulmus Americana?</i>	Rich woods
2 <i>Prunus serotina</i>	Uplands
1 <i>Nyssa sylvatica</i>	Swamps mostly
1 <i>Tsuga canadensis</i>	Gravelly woods
1 <i>Fraxinus americana</i>	Rich woods
1 <i>Quercus bicolor</i>	Swamps mostly
1 <i>Juglans cinerea</i>	Rich woods, eastern portion.

SMALL TREES

<i>Cornus florida</i>	Uplands
<i>Betula populifolia</i>	Various habitats
<i>Viburnum prunifolium</i>	Rich woods mostly
<i>Sassafras variifolium</i>	Rich woods, etc.
<i>Carpinus caroliniana</i>	Rich or damp woods
<i>Ostrya virginiana</i>	Rich woods

WOODY VINES

<i>Rhus radicans</i>	Various habitats
<i>Parthenocissus quinquefolia</i>	Rich woods mostly
<i>Vitis aestivalis</i>	Rich woods
<i>Smilax rotundifolia</i>	Rich woods, etc.
<i>Celastrus scandens</i>	Rich woods, etc.
<i>Rubus hispidus</i>	Damp woods

SHRUBS

<i>Rubus nigrobaccus?</i>	Rich woods
<i>Decodon verticillatus</i>	Peat bogs
<i>Viburnum acerifolium</i>	Rich woods, etc.
<i>Benzoin aestivalis</i>	Damp woods mostly
<i>Sambucus canadensis</i>	Damp woods mostly

* Most of the hickories seem to be *H. alba*, but there are two or three other species which the writer has not yet identified satisfactorily. They are all lumped together here, but if they were separated they would of course come lower down in the list.

† This combination was made by Sargent and Ashe almost simultaneously, about the middle of March, 1916 (*Rhodora* 18: 48; *Proc. Soc. Am. Foresters* 11: 90), as a new name for the common eastern tree which had long passed for *Quercus rubra* L. In this latitude it is not always easy to distinguish from *Q. velutina*, and further investigations may modify their percentages.

<i>Viburnum dentatum</i>	Rich woods and swamps
<i>Clethra alnifolia</i>	Swamps and bogs
<i>Rubus occidentalis</i>	Rich woods
<i>Vaccinium corymbosum</i>	Swamps
<i>Cephalanthus occidentalis</i>	Around ponds, etc.
<i>Azalea viscosa</i>	Swamps and bogs
<i>Corylus americana</i>	Dry woods
<i>Vaccinium vacillans?</i>	Gravelly woods
<i>Rhus Vernix</i>	Swamps
<i>Cornus alternifolia</i>	Rich woods
<i>Alnus rugosa</i>	Wet meadows, etc.
<i>Iva oraria</i>	Salt marshes
<i>Leucothoe racemosa</i>	Swamps and bogs

(and about 20 others)

HERBS

<i>Aster divaricatus</i>	Rich woods mostly
<i>Washingtonia longistylis</i>	Rich woods
<i>Wagnera racemosa</i>	Rich woods
<i>Typha angustifolia</i>	Fresh and brackish marshes
<i>Falcata comosa</i>	Rich or damp woods
<i>Solidago caesia</i>	Rich or dry woods
<i>Arisaema triphyllum</i>	Rich or damp woods
<i>Impatiens biflora</i>	Damp woods mostly
<i>Lysimachia quadrifolia</i>	Dry woods mostly
<i>Typha latifolia</i>	Fresh and brackish marshes
<i>Geranium maculatum</i>	Rich woods
<i>Circaea latifolia</i>	Rich woods
<i>Collinsonia canadensis</i>	Rich woods
<i>Scirpus americanus</i>	Brackish marshes
<i>Eupatorium purpureum?*</i>	Rich woods, etc.
<i>Phragmites communis</i>	Fresh and brackish marshes
<i>Tovara virginiana</i>	Rich woods mostly
<i>Potentilla canadensis?</i>	Dry woods, etc.
<i>Lemna minor</i>	Fresh marshes
<i>Unifolium canadense</i>	Rich or damp woods
<i>Dryopteris noveboracensis</i>	Rich or damp woods
<i>Spartina patens</i>	Salt marshes
<i>Luncoides campestre</i>	Rich or dry woods
<i>Onoclea sensibilis</i>	Rich or damp woods
<i>Asplenium Filix-foemina</i>	Rich or damp woods
<i>Polygonatum biflorum</i>	Rich woods
<i>Carex Pennsylvanica</i>	Dry woods
<i>Dryopteris Thelypteris</i>	Fresh marshes, etc.
<i>Spathyema foetida</i>	Swamps
<i>Carex rosea</i>	Rich woods

* The tall purple-flowered *Eupatorium* in rich woods may not be the same species as the one in wet meadows.

<i>Smilax herbacea</i>	Rich woods
<i>Washingtonia Claytoni</i>	Rich woods
<i>Allium tricoccum</i>	Richest woods
<i>Deringa canadensis</i>	Rich woods
<i>Triadenum virginicum</i>	Peat bogs
<i>Viola papilionacea?</i>	Rich woods, etc.
<i>Nabalus</i> sp.	Rich woods
<i>Spartina polystachya</i>	Brackish marshes
<i>Carex laxiflora</i>	Rich woods
<i>Carex digitalis</i>	Gravelly woods mostly
<i>Sagittaria latifolia</i>	Fresh marshes
<i>Aster macrophyllus</i>	Dry woods
<i>Sium cicutaefolium</i>	Fresh marshes
<i>Pellandra virginica</i>	Swamps and marshes
<i>Solidago sempervirens</i>	Brackish marshes
<i>Panicum virgatum</i>	Brackish marshes, etc.
<i>Juncus Gerardi</i>	Salt marshes
<i>Osmunda cinnamomea</i>	Woods and swamps
<i>Geum canadense</i>	Rich woods
<i>Carex stricta</i>	Meadows and marshes
<i>Aster cordifolius</i>	Dry woods
<i>Cimicifuga racemosa</i>	Rich woods
<i>Cinna arundinacea</i>	Rich or damp woods
<i>Aralia nudicaulis</i>	Dry woods mostly
<i>Uvularia sessilifolia</i>	Rich or damp woods
<i>Scrophularia</i> sp.	Rich or gravelly woods
<i>Hibiscus Moscheutos</i>	Brackish marshes
<i>Osmunda regalis</i>	Damp woods
<i>Carex virescens</i>	Gravelly woods, etc.
<i>Dulichium arundinaceum</i>	Peat bogs
<i>Carex cephalophora</i>	Rich woods
<i>Panicularia nervata</i>	Wet meadows
<i>Carex lurida</i>	Meadows and marshes
<i>Carex stipata</i>	Fresh marshes
<i>Cuscuta</i> sp.	Bogs and marshes
<i>Eleocharis tenuis</i>	Meadows and marshes
<i>Syndesmon thalictroides</i>	Rich woods
<i>Galium circaezans</i>	Rich woods
<i>Solidago rugosa</i>	
<i>Carex crinita</i>	Damp woods
<i>Eupatorium perfoliatum</i>	Meadows, etc.
<i>Polygonatum arifolium</i>	Swamps
<i>Sanicula Marilandica</i>	Rich woods

(and over 200 others)

Comments on the list. The 121 species above enumerated probably make up 95 per cent. or more of the total native plant population. The only evergreen tree is *Tsuga*, which makes

up only an insignificant part of the total stand of timber, certainly less than 1 per cent. About 15 per cent. of the shrubs belong to the Ericaceae and allied families. The only leguminous plant abundant enough to be listed among the first 75 native herbs is *Falcata comosa*, which constitutes about 4 per cent. of the total herbage outside of the marshes. (The next in abundance seems to be *Meibomia nudiflora*, which would come about 100th on the list.) The scarcity of members of this family is probably due to the aversion of most of them to humus.*

Cornus florida is evidently numerically the most abundant tree, but it constitutes probably not more than 5 per cent. of the total bulk of the forest, on account of its small size. It is about five times as abundant as its nearest competitor among the small trees. It would probably be hard to find a region of equal size where *Betula lenta* is more abundant than it is here. And it is interesting to find *Liquidambar* making up about 5 per cent. of the total forest here within a few miles of its northern limit.† The same might be said of *Liriodendron*, except that that ranges about 100 miles farther north.

Although no figures are given here for the vines and shrubs, the two commonest vines are just about as abundant as the two commonest shrubs. The abundance of vines indicates the infrequency of fire, for as far as known to the writer all woody vines are sensitive to fire.‡ The same thing is indicated by the presence of several ferns,§ and the abundance of herbs with fleshy or barbed fruits, such as *Vagnera*, *Arisaema*, *Unifolium*, *Polygonatum*, *Smilax*, *Allium*, *Washingtonia*, *Circaea*, *Deringa*, *Geum*, and *Galium*.|| For such fruits normally remain on the

* See Rep. Fla. Geol. Surv. 6: 177, 238, 301, 319, 1914; 7: 138-139, 174, 180. 1915.

† In Mississippi, which probably has more *Liquidambar* than any other state, it makes up only about 9 per cent. of the present forest of the state, according to the writer's (unpublished) estimates.

‡ See Rep. Fla. Geol. Surv. 6: 227, 287, 318. 1914; 7: 167, 174, 176. 1915.

§ See Am. Fern Jour. 6: 76 (footnote). Sept. 1916.

|| For notes on the occurrence of fleshy and barbed fruits, but without special reference to fire, see Davis, Rep. Mich. Geol. Surv. 1906: 165. 1907; Warming, Oecology of Plants 88, 312. 1909; Harper, Bull. Torrey Club 31: 16. 1904; Ann. N. Y. Acad. Sci. 17: 49, 54, 61, 88, 101, 105. 1906. The comparative scarcity of such fruits in prairies and pine-barrens, which are burned over every few years, is quite noticeable.

plant for several months, and a fire in fall or early winter would be disastrous to them. (It is not claimed that fire is unknown in this region, however. Evidences of it may be seen in many places in the woods, but it probably does not occur often enough in any one spot to have any lasting effect on the vegetation.)

Comparisons with other regions.—The following species are evidently more abundant here than in the unglaciated portion of Queens County on the south and the glaciated portion of Nassau on the east, both of which have poorer soils:—TREES: *Liriodendron*, *Liquidambar*, *Ulmus*, *Quercus bicolor*. SMALL TREES: *Viburnum prunifolium*, *Carpinus*. VINES: *Rhus radicans*, *Celastrus*. SHRUBS: *Rubus nigrobaccus?*, *Decodon*, *Viburnum dentatum*, *Sambucus*, *Benzoin*, *Rubus occidentalis*. HERBS: *Aster divaricatus*, *Geranium*, *Washingtonia longistylis*, *Arisaema*, *Falcata*, *Carex rosea*, *Washingtonia Claytoni*, *Tovara*, *Allium*, *Circaea*, *Dryopteris Noveboracensis*, *Juncoides campestre*.

An investigation of what species are less abundant here than elsewhere brings out some interesting facts. The plants listed below are fairly common in some places within 100 miles of here, either on Long Island or on the mainland, or both, but comparatively rare or wanting in the area under consideration. Where the name of a genus (or family) stands alone it means that several or all of the northeastern species (in some cases there is only one in the northeastern flora) are found not far away, but none are common here. Where the generic name is followed by 'spp.' it means that some of the species are common elsewhere and rare here, but there may be one or more common here too. Where such genera have been subdivided lately (*e. g.*, *Andropogon*, *Clematis*, *Saxifraga*, *Prunus*, *Linum*, *Cornus*, *Gentiana*) the names are here used in the older and broader sense, unless some particular segregate or species is designated. If space permitted one might go through a manual, or Taylor's recent *Flora of the vicinity of New York*, and pick out many additional species which from the published statements about their ranges might be expected to be common here but are not. Of course native plants only are considered. In this list the names of evergreens only are in italics, and of families in small capitals.

TREES: *Pinus*, *Tsuga*, *Juniperus*, *Chamaecyparis*, *Populus*, *Salix*, *Ostrya*, *Hicoria ovata*, *Betula Allegheniensis*, *B. lutea*, *Quercus coccinea*, *Q. Marylandica*, *Q. montana*, *Q. stellata*, *Ulmus*, *Morus*, *Platanus*, *Crataegus*, *Acer Saccharum*, *A. saccharinum*, *Tilia*, *Diospyros*, *Fraxinus* spp.

SHRUBS AND VINES: *Juniperus communis depressa*, *Smilax glauca*, *Salix* spp., *Myrica*, *Comptonia*, *Corylus*, *Quercus ilicifolia*, *Q. prinoides*, *Hamamelis*, *Ribes*, *Spiraea*, *Prunus maritima* and others, *Amelanchier*, *Crataegus*, *Ceanothus*, *Azalea nudiflora*, *Kalmia*, *Chamaedaphne*, *Pieris Mariana*, *Arctostaphylos*, *Gaylussacia*, *Polycodium*, *Vaccinium* spp., *Rhus hirta*, *R. copallina*, *Ilex glabra*, *Nemopanthes*, *Dirca*, *Viburnum Lentago*, *V. cassinoides*, *Lonicera*, *Diervilla*, *Baccharis*.

HERBS: *Botrychium*, *Dennstaedtia*, *Dryopteris* spp., *Anchistea*, *Lorinseria*, *Asplenium platyneuron*, *Pteridium*, *Polypodium*, *Equisetum* spp., *Lycopodium*, *Selaginella*, *Isoetes*; *Potamogeton*, *Triglochin*, *Vallisneria*, *Andropogon*, *Sorghastrum*, *Paspalum*, *Aristida*, *Muhlenbergia*, *Brachyelytrum*, *Sporobolus*, *Calamagrostis*, *Deschampsia*, *Eragrostis*, *Elymus*, *Cyperus*, *Eleocharis* spp., *Scirpus* spp., *Rhynchospora*, *Carex* spp., *Spirodela*, *Xyris*, *Pontederia*, *Juncus* spp., MELANTHACEAE, *Lilium*, *Erythronium*, *Aletris*, *Vagnera stellata*, *Trillium*, *Iris*, ORCHIDACEAE; *Saururus*, *Urticastrum*, *Boehmeria*, *Comandra*, *Asarum*, *Persicaria*, *Polygonella*, *Claytonia*, *Silene*, *Brasenia*, *Castalia*, *Caltha*, *Aquilegia*, *Anemone*, *Hepatica*, *Clematis*, *Ranunculus*, *Podophyllum*, *Sanguinaria*, *Bicuculla*, *Capnoides*, CRUCIFERAE, *Sarracenia*, *Drosera*, *Parnassia*, *Chrysosplenium*, *Heuchera*, *Tiarella*, *Saxifraga*, *Sanguisorba*, LEGUMINOSAE, *Geranium Robertianum*, *Linum*, *Polygala*, EUPHORBIACEAE, *Hypericum*, CISTACEAE, *Viola pedata* and several others, *Opuntia*, *Rhexia*, *Kneiffia*, *Proserpinaca*, *Myriophyllum*, *Aralia*, *Panax*, *Hydrocotyle*, *Zizia Oxypolis*, *Pyrola*, *Chimaphila*, *Monotropa*, *Hypopitys*, *Epigaea*, *Gaultheria*, *Trientalis*, *Limonium*, *Sabbatia*, *Gentiana*, *Bartonia*, *Apocynum*, *Asclepias*, *Acerates*, *Ipomoea*, LABIATAE, *Chelone*, *Mimulus*, *Gratiola*, *Ilysanthes*, *Veronica*, *Leptandra*, *Aureolaria*, *Agalinis*, *Melampyrum*, LENTIBULARIACEAE, *Plantago* (native species), *Houstonia*, *Mitchella*, *Triosteum*, *Campanula*, *Lobelia*, *Eupatorium* spp., *Laciniaria*, *Chrysopsis*, *Solidago* spp., *Sericocarpus*, *Aster* spp., *Erigeron pulchellus*, *Doellingeria*, *Ionactis*, *Antennaria* (except *A. neglecta*), *Rudbeckia*, *Helianthus*, *Hieracium* spp.

The scarcity of many of these is easily explained by the rarity or absence of fire, rivers, ponds, peat bogs, dunes, rock outcrops, and sandy, calcareous, and alluvial soils; but some of the cases are still mysteries. Quite a number of the absentees are in the neighborhood of New York chiefly confined to mountainous regions, but range southward to Middle Georgia or thereabouts, so that it can hardly be any temperature factor that keeps them away from Long Island.

The species of *Crataegus* seem to be most numerous in calcareous regions, but there are many non-calciphile species in the genus, which one might suppose could find a congenial home here. But many of the recently described species are known

only from pastures, which scarcely exist in Queens County at present (probably because the land is too valuable to be used that way).

The case of *Juniperus Virginiana* is especially interesting. This is very common on the poor gravelly soils of north-central Long Island, as well as on rather rich soils in southern Connecticut, central New Jersey, Virginia, and farther south and west; but in northern Queens County it occurs outside of cultivation only in a few of the more gravelly spots. There are plenty of fields and roadsides where it would be well protected from fire—to which it seems to be very sensitive—but perhaps the presence of earthworms in the soil is detrimental to it in some way, as suggested a few years ago.* The factor in the soil, whether worms, fungi, or something else, that hinders the growth of the cedar (and the same might be said of the pines and other evergreen trees) probably operates chiefly at the time of germination, for such trees when set out seem to grow very well.† The same explanation, when found, will probably apply also to such evergreens as *Juniperus communis depressa*, several Ericaceae and pteridophytes, *Hepatica*, *Opuntia*, *Mitchella* and *Antennaria*, as well as to the Orchidaceae.‡ Evidently the soil fauna and other soil organisms deserve more attention from ecologists than they have had hitherto.

Some herbs that are much sought for their flowers, such as *Erythronium*, *Trillium*, various orchids, *Anemone quinquefolia*, *Bicuculla*, *Viola pedata*, *Epigaea*, *Gentiana crinita*, and *Castilleja*, may possibly have been exterminated or nearly so by strollers and flower-pickers, for in a great city there are very few spots in these woods that are not trampled over by some one every year or so. But the dogwood, which is one of the greatest sufferers from vandalism, is still the most abundant tree in

* Torrey *12*: 149. 1912.

† Richard H. Boerker, in a privately printed thesis entitled Ecological investigations upon the germination and early growth of forest trees (Lincoln, Neb., Jan. 1916) states that pine seedlings in loamy soil are very subject to damping-off.

‡ In this connection the suggestion of Griggs that evergreen herbs grow chiefly in places where they are not crowded or likely to be smothered by falling leaves (see Torrey *15*: 30-31. 1915) deserves consideration.

this region, as already stated. And *Vagnera*, *Arisaema* and *Geranium* seem to be holding their own very well.

Of course it might be said that the absence of any given species from such a small and long-settled region, with only five or six square miles of natural vegetation left, has no particular significance. But many of the species which are scarce here are equally scarce in much larger areas in the same latitude, and probably for the same reasons.

COLLEGE POINT, L. I.

NOTES REGARDING VARIABILITY OF THE ROSE MALLOWS

A. B. STOUT

The swamp rose mallows usually classed as *Hibiscus Moscheutos* grow in abundance along the coastal region of the eastern United States, extending inland in somewhat scattered stations to Missouri. The tall vigorous growth of the plant with the production of numerous, large, gayly colored and conspicuous flowers makes it a noticeable and popularly well-known feature of the vegetation.

In regard to numbers, what may perhaps be considered as a climax development for the species is seen in marshes along the coast of southern New Jersey, especially in the vicinity of Sea Side. Here, a casual survey of the population of mallows will reveal marked variations. Especially is this the case in color of flowers which may range from white to a rather solid intense red with numerous grades of intermediate pinks and with various types of eye coloration combined variously with blade colors. One feature of this variation was recognized in the proposal of a new species by Britton (1903) which was named *Hibiscus oculiroseus*, and by the observation that hybridization between this and the ordinary pink-flowered form of *H. Moscheutos* results in an F₁ hybrid generation that is intermediate and which is of a form frequently seen in nature.

In 1912, at the suggestion of Dr. N. L. Britton, the writer began breeding experiments to determine various points regard-